



CTIA is the International Association for the Wireless Telecommunications Industry. Dedicated to Expanding the Wireless Frontier

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How Wireless Works

A wireless phone is really a radio – a very sophisticated and versatile radio. Much like a walkie-talkie, a cell phone receives and sends radio waves. But wireless devices offer much more than the ability to call any telephone anywhere in the world. They also provide millions of Americans with access to the Internet and can perform tasks such as emailing and text messaging. Mobile products and services are also used to improve efficiencies and effectiveness in a variety of other industries such as healthcare, education, transportation and energy.

What's Inside

Inside your wireless phone, there is a compact speaker, a microphone, a keyboard, a display screen and a powerful circuit board with microprocessors that make each phone a miniature computer. When connected to a wireless network, this bundle of technologies allows you to make phone calls or exchange data with other phones and computers around the world. The components operate so efficiently that a lightweight battery can power your phone for days.

Today, wireless phones fit in the palm of your hand, weigh only a few ounces and offer features such as musical ring tones and voice-activated dialing. With wireless data services, you can browse the Internet, send and receive email, play video games, stream video and download thousands of apps – all on your wireless device.

The Nuts and Bolts

Wireless networks operate on a grid that divides cities or regions into smaller cells. One cell might cover a few city blocks or up to 250 square miles, depending on the amount of network traffic a carrier anticipates in a given area. Every cell uses a set of radio frequencies or channels to provide service in its specific area. The power of these radios is controlled in order to meet federal safety standards and to limit the signal's geographic range, which means the same frequencies can be reused in nearby cells. This allows many people to have conversations simultaneously in different cells throughout the city or region, even though they are on the same channel.

In each cell, there is a base station consisting of a wireless antenna and other radio equipment. The wireless antenna in each cell links callers into the local telephone network, the Internet or to another wireless network.

No longer just big radio towers, wireless antennas can be mounted on top of or on the sides of buildings, in church steeples, on trees and flagpoles, or in homes or offices. Many are no larger than conventional sized stereo speakers. In rural areas, taller antennas send signals further distances to better serve users who are more spread out. Wireless antennas transmit signals just like your local radio station. And just like you might notice sometimes on your car radio, these radio signals can be interfered with by trees, tall buildings and bad weather.

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Yes! You can recycle your wireless device. All wireless phones and their

accessories are recyclable. CTIA and its member companies have established Wireless... The New Recyclable™, a national voluntary recycling program for wireless devices and accessories.

To learn more [click here](#).

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Connecting to the Wireless Network

When you turn on your wireless phone, it searches for a network signal to confirm that service is available. Then the phone transmits unique identification numbers, so the network can verify your necessary customer information – such as your wireless provider, phone number and location.

If you are calling from a wireless device to a wired phone, your call travels through a nearby wireless antenna and is switched by your wireless carrier to the traditional landline phone system. The call then becomes like any other phone call and is directed over the traditional phone network and to the person you are calling.

If you are calling another wireless device, your call might go through the landline network to the recipient's wireless carrier, or it might be routed within the wireless network to the cell site nearest the person you called.

If you're calling someone further away, your call will be routed to a long distance switching center, which relays the call across the country or around the world through fiber-optic cables.

All of this takes place in a few seconds – before you say "hello."

Making it Mobile

Most wireless phones use digital technology, which converts your voice into the binary digits 0 and 1 – much like a music CD. These small packets of data are actually broken up and relayed through wireless networks to the receiving phone. On the other end, the conversion process is reversed and the person you are calling hears your voice. Again, all of this happens incredibly quickly because of the sophisticated technology.

But what makes your phone mobile? Say you're talking on your wireless phone while walking down the street. The wireless network senses when your signal might be moving further away from a cell tower and is getting weaker. So, it hands off your call to an antenna with a stronger signal. Using smaller cells, which means more towers or base stations, enables your phone to use less power and keep a clearer signal as you move. Even when you're not talking, your wireless phone communicates with the wireless antenna nearest to you so it's ready to connect your call at any time.

If you travel outside your home area and make a call, another wireless carrier might provide service for your wireless phone. That provider sends a signal back to your home network, so you can send and receive calls as you travel. This is called roaming. Roaming is key to mobile communications, as wireless providers cooperate to provide callers service wherever they go.

Since the shape and size of cells vary, there might also be empty spaces between the coverage areas of two or more cells. These gaps or dead spots can also be caused by trees, tall buildings or other obstructions that block your wireless signal from reaching a nearby antenna. Wireless service providers work hard to provide extensive coverage. Since the laws of physics govern wireless signals, some dead spots exist because a local government or landowner won't allow placement of a wireless antenna in a specific area or if the signals are disrupted by the topography of an area.

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mywireless.org

MyWireless.org is a non-profit consumer advocacy organization giving wireless consumers a powerful and unified voice to protect the freedom, value, security and mobility they enjoy with wireless services.

MyWireless.org brings together consumers from across the country to protect their wireless rights in their cities, states, and nationally to keep them connected, and to ensure their voices are heard.

For more information [click here](#).

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Doing More With Data

A wireless phone is actually a computer connected to a radio. So, it works much like your personal computer to send and receive information. Digital technology is used to convert data, such as short messages, e-mail, digital pictures and video or websites into small packets of 0's and 1's. These packets are transmitted securely over wireless systems so that you can share data with another user, or have access to the mobile Web.

The wireless industry is continually developing more efficient technology, so it can support more callers per cell site, while offering better sound quality, greater security, longer battery life and faster data services.

As the wireless industry converts to packet-based networks using the same technology as the Internet, wireless data services continue to expand. Today wireless networks operate at data speeds five to ten times greater than dial-up telephone or earlier wireless networks. Fourth generation data networks such as LTE, HSPA+ and WiMAX can support even greater transmission speeds and high-demand applications such as streaming HD video.

These faster and more efficient networks mean that Americans will be able to manage their professional and personal lives in fantastic new ways. Internet services formerly available only on desktop computers will become available anywhere, in the palm of your hand, as a result of digital wireless technology.

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